

REMARKS

Applicant encloses a check in the amount of \$860 to cover the fee associated with the accompanying Request for Continued Examination and Petition for an extension of time.

In the Office Action mailed 13 September 2002, by Examiner Sellers in Art Unit 1712, Claims 1 and 3-20 are pending and all stand rejected with claims 6, 8, and 10-17 withdrawn from consideration. By the present Amendment and Response, Applicant has canceled Claims 1, 3-5, 7, 9, 19 and 20. New Claims 21-32 have been added. No new matter is believed to have been added.

Rejections Under 35 U.S.C. § 103(a)

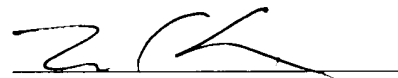
The Action rejected the previously pending claims under 35 U.S.C. §103(a) as being unpatentable over a variety of prior art that disclose compounds that contain epoxide-modified polyurethane resins. The prior art patents and articles which describe the epoxide-terminated polyurethanes as claimed do not disclose the use of these compounds as electrically conductive adhesives. There is also no suggestion or motivation disclosed in these patents to use these compounds as an electrically conductive adhesive. In fact, as evidenced by Example 3, the printed circuit boards that used the claimed electrically conductive adhesive passed the NCMS higher standard for the height recommended for telecommunication applications. Given the fact that NCMS has yet to identify a commercially available adhesive with adequate impact properties, there would be no suggestion or motivation to attempt to use these adhesive compounds containing epoxide-terminated polyurethanes as an electrically conductive adhesive because there would be no perceived benefit because of the previous failures of other types of adhesives. Therefore, there would not have been an expectation that the results for the adhesives containing epoxy-terminated polyurethanes would have been any different. Therefore, given the unexpected results, new Claims 21-32 should be entered.

CONCLUSION

In light of the foregoing Amendment and Remarks, Applicant believes that the pending claims are in condition for allowance. Favorable consideration and allowance of the present application is hereby courteously requested.

Respectfully submitted,

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MARKED UP VERSION OF AMENDED CLAIMS SHOWING CHANGES MADE

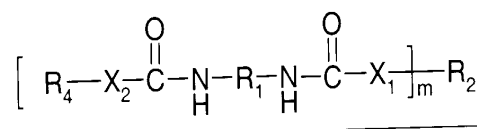
The following is a marked-up version of the amended claims. Deleted text sections are indicated in ~~strikeout~~ and newly inserted text is bolded and underlined.

21. (new) A circuit board comprising of:

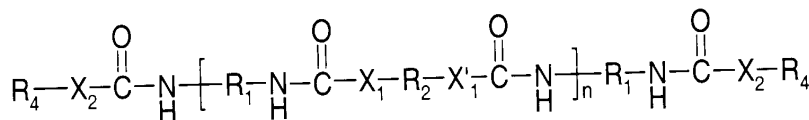
a chip attached to said circuit board by an electrically conductive adhesive,

wherein said electrically conductive adhesive comprises of, an epoxide-modified polyurethane resin, a cross-linking agent, an adhesion promoter, and a conductive filler,

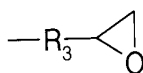
wherein said epoxide-modified polyurethane resin has the following structure:



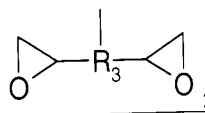
or



where m is 2 or 3; n is one or greater; R₁ is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an aromatic hydrocarbon radical, or an araliphatic hydrocarbon radical; R₂ is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an alkoxy radical, a polyester; or a polyether; R₄ is either:



or



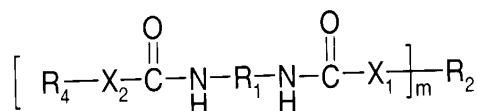
R₃ is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an alkoxy radical, a polyester, or a polyether; and X₁ and X₂ are either a single bond, -O-; -COO-; -NH-; or -S-.

22. (new) The circuit board as defined in Claim 21, wherein the cross-linking agent is selected from the group consisting of aliphatic amines, aromatic amines, carboxylic acid anhydrides, thiols, alcohols, phenols, isocyanates, tertiary amines, boron complexes, inorganic acids, hydrazides, imidazoles and their derivatives, and modified products thereof.
23. (new) The circuit board as defined in Claim 22 wherein the cross-linking agent is a carboxylic acid anhydride cross-linker.
24. (new) The circuit board as defined in Claim 21, wherein the cross-linking agent is selected from the group consisting of liquid imidazoles and anhydrides.
25. (new) The circuit board as defined in Claim 21, wherein the adhesion promoter is selected from the group consisting of alkylchlorosilanes, dialkyldichlorosilanes, alkyltrichlorosilanes; organosilane esters; vinylsilanes; aminoalkylsilanes; diaminoalkylsilanes; styrylaminoalkylsilanes; ureidoalkylsilane esters; epoxyalkylsilane esters; alkoxysilanes; acryloxyalkylsilane esters; methacryloxyalkylsilane esters; and mercaptoalkylsilane esters, and combinations thereof.
26. (new) The circuit board as defined in Claim 21, wherein said conductive filler is a solid metal particle selected from the group of nickel, copper, aluminum, palladium, silver, gold, and platinum.
27. (new) The circuit board as defined in Claim 26, wherein said conductive filler is silver flakes.
28. (new) The circuit board as defined in Claim 21, wherein said conductive filler is selected from the group consisting of carbon black, carbon fiber, and graphite.

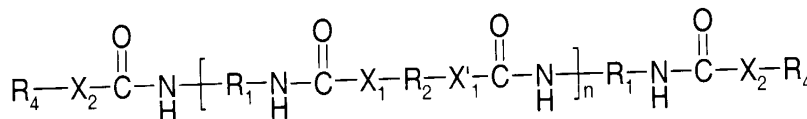
29. (new) The circuit board as defined in Claim 21, further comprising one or more of (e) an epoxy resin; (f) a catalyst; and (g) a diluent.

30. (new) A method of joining electrically conductive materials, which comprises of applying an electrically conductive adhesive composition to at least one of said electrically conductive materials, wherein said electrically conductive adhesive composition consists of, an epoxide-modified polyurethane resin, a cross linking agent, an adhesion promoter, and a conductive filler,

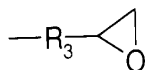
wherein said epoxide-modified polyurethane resin has the following structure:



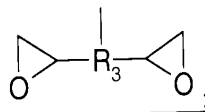
or



where m is 2 or 3; n is one or greater; R_1 is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an aromatic hydrocarbon radical, or an araliphatic hydrocarbon radical; R_2 is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an alkoxy radical, a polyester; or a polyether; R_4 is either:



or



R_3 is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an alkoxy radical, a polyester, or a polyether; and X_1 and X_2 are either a single bond, $-O-$; $-COO-$; $-NH-$; or $-S-$.

31. (new) The method of claim 30 wherein said electrically conductive materials are at least one of the following; a chip and a printed circuit board.

32. (new) The method of claim 30 wherein said electrically conductive adhesive composition further comprises of at least one of the following; an epoxy resin, a catalyst, and a diluent.